1150-60-362 **Tung D Nguyen***, nguyen34@wisc.edu, and **David F Anderson**. *Prevalence of deficiency zero reaction networks.*

In the mathematical study of reaction networks, the most classical results are those pertaining to models that have a deficiency of zero. In particular, for deterministic models it is well known that weak reversibility and a deficiency zero of the reaction network implies that the model is complex balanced. In the stochastic setting it is known that weak reversibility and a deficiency of zero implies the existence of a stationary distribution that is a product of Poissons.

Given that deficiency zero models play such a significant role in the mathematical study of reaction networks, a natural question is how prevalent are they? In order to answer this question, we consider reaction networks under the Erdos-Renyi random graph framework. In particular, we start with n species, and then let our possible vertices be all zeroth, first, and second order complexes that can be produced from the n species. Edges, or reactions, between two arbitrary complexes then occur independently with probability p_n. We establish a function $r(n)$, termed a *threshold function*, such that the probability of the random network being deficiency zero converges to 0 if $p_n \gg r(n)$ and converges to 1 if $p_n \ll r(n)$. (Received July 13, 2019)